

1.4 Market failure – The meaning and types of market failure

Learning Outcomes

- Analyze the **concept** of market failure as a failure of the market to achieve allocative efficiency, resulting in an over-allocation of resources (overprovision of a good) or an under-allocation of resources (under-provision of a good).
- Describe the concepts of marginal private benefits (MPB), marginal social benefits (MSB), marginal private costs (MPC), and marginal social costs (MSC).
- Describe the meaning of externalities as the failure of the market to achieve a social optimum where $MSB = MSC$.

Synonyms

concept(s) idea(s)/
theory/ies

consumption ... use

Subject vocabulary

factors of production the inputs into the production process (land, labour, capital and entrepreneurship)

allocative efficiency the best or optimal allocation of resources from society's point of view. It occurs when the market is in equilibrium and social surplus is maximized (where $P = MC$).

marginal cost the change in total cost resulting from a change in output of one unit

resources the inputs into the production process, the factors of production

equilibrium a market is in equilibrium where the quantity supplied is equal to the quantity demanded

producer surplus the difference between the price a firm is willing to accept for a unit of output and the price the consumer actually pays

free market a market where the forces of demand and supply are allowed to operate without any forms of intervention

surplus occurs when quantity supplied is greater than quantity demanded, another term for excess supply

shortage when quantity demanded is greater than quantity supplied (another term for excess demand)

benefit the satisfaction gained from the consumption of a good

marginal benefit is the additional benefit received by a person from the consumption of an additional unit of output

What is market failure?

Markets fail when **factors of production** are not allocated efficiently. **Allocative efficiency** occurs when price, which is the value consumers in society place on the **consumption** of the marginal unit of output, is equal to the **marginal cost**, which is the value of the **resources** used to produce the additional unit. An allocatively efficient outcome occurs when the market is in **equilibrium** where the sum of consumer and **producer surplus**, which is called community surplus, is maximized. Therefore a **free market** fails when there is a **surplus** or **shortage**. Either too many factors are allocated to the production of the good, leading to over provision of the good (surplus) or not enough factors are allocated to the production of the good, leading to under provision of the good (shortage). When price, the value consumers in society place on the benefit gained from the next unit consumed, does not equal marginal cost community surplus is not maximized and the market fails.

Why is the marginal benefit curve the demand curve?

Price is a reflection of the value consumers place on the consumption of the marginal or additional unit. Consumers gain a **benefit** or utility from the consumption of the additional unit of a good consumed and price is a measure of the benefit gained. As consumers consume more of a good the additional or **marginal benefit** gained falls. This is the **law of diminishing marginal utility**. Therefore the value the consumers place on the additional unit, which is the price, also falls. So as quantity consumed increases the price the consumers are prepared to pay falls. If consumers are to buy more of a good the price must fall to reflect the fall in the benefit gained from the consumption of it. The **demand curve** is a reflection of the price consumers are willing to pay for an additional unit of a good, which itself is a reflection of the additional or marginal benefit gained from the consumption of the next unit. The demand curve is therefore derived from the marginal benefit curve which shows the relationship between the benefit gained and quantity consumed.

What is the difference between marginal private benefits and marginal social benefits? – a step-by-step guide

Trouble shooter

The benefit gained by the consumer from the consumption of a good is called private benefit.

The benefit gained from the consumption of an additional unit of the good is called **marginal private benefit**.

The consumption of some goods has a **spillover effect** on third parties. People outside of the market benefit from the good being consumed despite not paying for the good or consuming it.

These are additional benefits gained by society. The benefits gained by third parties are called **external benefits** or **positive externalities** because they are benefits that go to people who are external to or outside the market.

Marginal external benefit is the benefit gained by third parties from the consumption of an additional unit of the good.

Marginal social benefit is the benefit society gains from the consumption of the additional unit. It is the sum of marginal private benefit and marginal external benefit

Model sentence: Marginal private benefits plus marginal external benefits equals marginal social benefit. The difference between MPB and MSB is MEB.

An example of a good that has positive externalities associated with its consumption is healthcare. If people are healthier it benefits others. Disease is less likely to spread and workers will be more productive at work helping the economy to grow. Education is another example. When consumed third parties benefit. Society needs a well-educated workforce to remain competitive. Society benefits from having doctors and engineers.

What is the difference between marginal private costs and marginal social costs? – a step-by-step guide

Trouble shooter

Firms incur costs when producing goods and services. For example firms pay rent and wages.

These costs are called **private costs**.

Firms also create costs that must be paid for by third parties.

These costs are called external costs or negative externalities. For example, costs of pollution.

They are costs created by the firm when producing goods but are paid for by society, often the taxpayer.

The true cost of production includes both private costs and external costs.

Marginal social cost is the cost to society of producing the additional unit of output. This is the sum of marginal private costs and marginal external costs.

Model sentence: Marginal private costs plus marginal external costs equal marginal social costs. The difference between MPC and MSC is MEC.

For example, a factory leaks harmful emissions into the atmosphere causing health problems to those living in the area. There are costs associated with this, such as the loss of earnings through illness of individuals affected and the cost, perhaps to the tax-payer, of treating the illnesses. The damage to the environment creates costs for future generations to pay.

Explain why externalities cause the market to fail to achieve a social optimum where $MSB = MSC$

In order to increase the **quantity supplied**, firms in an **industry** must allocate more resources to the production of the good. Therefore as quantity supplied increases, costs of the resources used to make the good increase. Marginal cost is the addition to **total cost** from increasing output by one unit. Marginal cost rises as output rises because of **diminishing returns to the variable factor**. For example, in the **short run** the quantity of labour is variable and the quantity of capital is fixed. A firm adds an additional worker (the marginal worker) to a fixed quantity of capital in order to increase supply of the good. As the firm continues to add labour to the fixed quantity of capital the addition to total output created by employing an extra worker falls. Therefore marginal cost, which is the addition to total cost of producing the next unit of output increases. Therefore as supply increases marginal cost increases. The supply curve therefore represents the marginal cost curve.

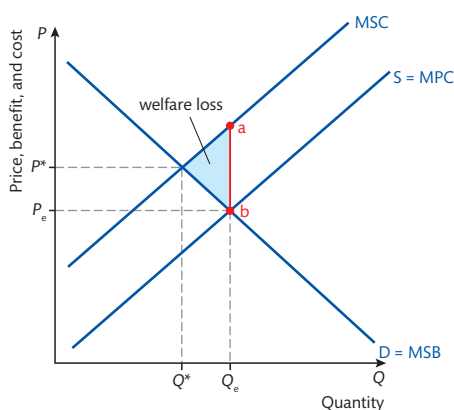


Figure 18.1. *a to b represents the external costs*

Consumers do not consider the marginal external benefits when deciding how much of a good to consume. They only consider marginal private benefits. Firms do not take into account the marginal external costs when setting output. They only consider the marginal private costs. Below is an explanation of the effects on a market when external costs exist.

Subject vocabulary

law of diminishing marginal utility a theory stating that the amount of satisfaction gained from the consumption of a good falls as more of the good is consumed

demand curve a graph that shows the relationship between price and quantity demanded

marginal private benefit the additional private benefit generated by the consumption or production of an additional unit of output

spillover effect externalities caused by the production or consumption of a good that affects people who are not directly involved in its production or consumption

external benefit occurs when the production or consumption of a good causes a benefit to third parties

positive externalities occur when the production or consumption of a good causes benefits to third parties. The existence of positive externalities means that social benefit is greater than private benefit.

marginal external benefit the additional positive externalities generated by the consumption or production of an additional unit of a good or service

marginal social benefit marginal social benefit = marginal private benefit + marginal external benefit. It is the additional social benefit generated by the consumption or production of an additional unit of output.

private costs the cost incurred by firms or consumers from their own production or consumption of a good

quantity supplied the amount of a good that firms are willing and able to produce at a given price over a given period of time

industry a group of firms that produce the same or similar goods or services

total cost the sum of total fixed cost and total variable cost

diminishing marginal returns to a variable factor as more of a variable factor is added to a quantity of fixed factors the product of each additional unit of the variable factor will, at some point, begin to fall

short run a period of time when at least one factor is variable and the others are fixed

Subject vocabulary

profit the difference between total revenue and total cost

social optimum price is where $MSB = MSC$. The value consumers in society place on the consumption of the next unit is equal to the cost of the resources used to produce the next unit, taking into account all external benefits and costs.

negative externalities occur when the production or consumption of a good creates costs that must be paid by third parties. The existence of negative externalities means that social cost is greater than private cost.

external cost occurs when the production or consumption of a good creates a cost that must be paid by third parties

In Figure 18.1 the market is in equilibrium at P_e, Q_e . If the firm had to pay all costs associated with the production of Q_e of goods, including the external costs, the price of P_e would not be enough to cover the costs. If the firm had to pay the social costs the firm would make a loss at P_e . The only reason it can make a **profit** at P_e is because it does not have to pay the external costs.

At Q_e MSC is greater than price. That is, the value of the resources used by society to produce the additional unit is greater than the value society places on the consumption of it. This is an allocatively inefficient outcome as far as society is concerned.

Social optimum price and level of output is achieved at $P^* Q^*$, where $MSB = MSC$. This is, as far as society is concerned, an allocatively efficient outcome: Price = MSC . The value society places on the additional unit of output consumed is equal to the value of society's resources used to produce it.

At output between Q^* and Q_e MSC exceeds MSB . Costs to society of this output are greater than the benefit society gains. This is a welfare loss and the whole area of welfare loss where $MSC > MSB$ is shown in Figure 18.1.

Model sentence: When external costs exist the good will be under priced, over produced, and over consumed. Left to the free market too many factors will be allocated to the production of the good.

Test your understanding of this unit by answering the following questions

- Explain the difference between private benefits and costs and external benefits and costs.
- Explain why negative externalities cause allocative inefficiency in free markets.

Learning Outcomes

- Explain, using diagrams and examples, the **concepts** of negative externalities of production and **consumption**, and the welfare loss associated with the production or consumption of a good or service.
- Explain that demerit goods are goods whose consumption creates external costs.
- Evaluate, using diagrams, the use of policy responses, including market-based policies (taxation and tradable permits), and government **regulations**, to the problem of negative externalities of production and consumption.
- Explain, using diagrams and examples, the concepts of positive externalities of production and consumption, and the welfare loss associated with the production or consumption of a good or service.
- Explain that merit goods are goods whose consumption creates external benefits.
- Evaluate, using diagrams, the use of government responses, including subsidies, legislation, and advertising to influence behaviour, and direct provision of goods and services.

Subject vocabulary

social costs the total costs to society from the production or consumption of a good. Social cost = private costs + external costs (negative externalities).

Synonyms

concept(s) idea(s)/theory/ies

consumption use

regulation(s) law(s)/rule(s)

Glossary

third parties people indirectly involved with/affected by an agreement/legal case between other people

Explain, using diagrams, why negative externalities of production cause welfare loss

Model sentence: Private costs are the costs created by the firm when producing goods that are paid for by the firm (e.g. wages, rent, and the cost of raw materials). **Negative externalities** or **external costs** are created by the firm but the firm does not pay the cost (e.g. costs associated with health problems and environmental damage caused by the harmful emissions from a factory).

The external costs are paid for by **third parties**, not the firm. Third parties are external to the market. They are not involved as producers or consumers yet must pay a cost.

Social costs are the sum of private and external costs ($PC + EC = SC$). **Marginal private cost** is the addition to total cost from producing the next unit. **Marginal external cost** is the addition to total external cost from producing the next unit. Added together they equal **marginal social cost** ($MPC + MEC = MSC$). Therefore when negative externalities occur the marginal social cost curve is above the marginal private cost curve.

In this example it is assumed that there are no external benefits associated with the production of the good, only external costs. Therefore $MSB = MPB$. The **profit**-maximizing firm does not take into account the external costs when making decisions about the level of output. So the firm sets output at Q_e where $MPC = MSB$. Note that the firm is not producing at the **social optimum level of output** where marginal social cost equals marginal social benefit. Factors are misallocated. Too many factors are allocated to the production of the good.

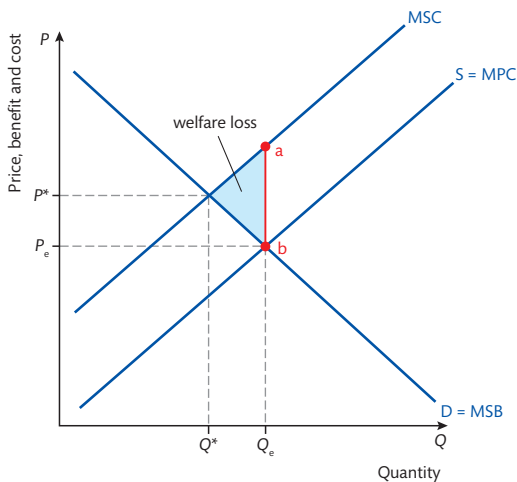


Figure 19.1

Explain, using diagrams, why negative externalities of consumption cause welfare loss

Model sentence: Consumers gain a **private benefit** from the consumption of goods. There are some goods that when consumed create external costs or negative externalities that third parties must pay.

The consumption of alcohol leads to violence, vandalism, accidents, and absenteeism from work and long-term health problems. The consumption of tobacco and other drugs create external costs, such as health problems caused by passive smoking and **burglaries** committed to fund the purchase of drugs. The use of cars creates external costs such as air pollution and noise pollution, as well as the cost to society of dealing with car accidents. The external costs of the consumption of fatty foods include the cost to society of provision of healthcare associated with obesity.

Model sentence: Goods that create negative externalities in consumption are called **demerit goods**.

The consumer does not consider the external costs when deciding how much of the good to consume. Only the marginal private costs and the **marginal private benefits** are taken into account. The consumer will consume up to the point where marginal private cost equals marginal private benefit. That is where the cost to the consumer of the additional unit, which is mainly the price paid, is equal to the value of the benefit gained from the consumption of the additional unit. **Private optimum level of consumption** is at Q_e and price P_e shown in Figure 19.2. However, the benefit gained by the consumer is greater than the benefit enjoyed by society as a whole. Therefore the **marginal social benefit** is less than marginal private benefit and the marginal social benefit curve is below the marginal private benefit curve as shown in Figure 19.2.

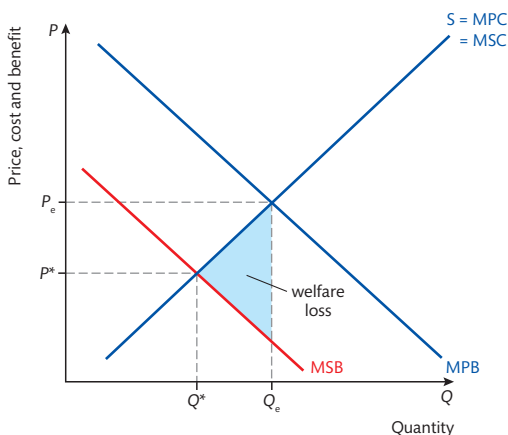


Figure 19.2

Output is too high and price is too low. Between Q_e and Q^* $MSC > MSB$. The value of the resources used by society to produce the additional unit (MSC) is greater than the benefit gained from the consumption of it (MSB). On all these units of output between Q_e and Q^* there is a **welfare loss**. Total welfare loss is shown by the shaded area in Figure 19.1.

Subject vocabulary

marginal private cost is the additional private cost generated by the consumption or production of an additional unit of output

marginal external cost the additional negative externalities generated by the consumption or production of an additional unit of a good or service

marginal social costs marginal social cost = marginal private cost + marginal external cost. It is the additional social cost generated by the consumption or production of an additional unit of output.

profit the difference between total revenue and total cost

social optimum level of output the level of production or consumption where marginal social benefit is equal to marginal social cost

welfare loss the sum of the loss of consumer and producer surplus caused by intervention or lack of competition in markets

private benefit the benefit firms or consumers receive from their own production or consumption of a good

demerit goods goods that are overprovided and overconsumed if left to the free market. Consumption produces negative externalities therefore marginal social costs are greater than marginal private costs.

marginal private benefit the additional private benefit generated by the consumption or production of an additional unit of output

private optimum level of consumption the level of consumption where the marginal private cost equals the marginal private benefit

marginal social benefit marginal social benefit = marginal private benefit + marginal external benefit. It is the additional social benefit generated by the consumption or production of an additional unit of output.

Glossary

burglaries breaking into buildings and stealing things

An explanation of welfare loss – a step-by-step guide

Trouble shooter (See Figure 19.2 on page 49)

At the private optimum level of consumption Q_e marginal social cost exceeds marginal social benefit.

This means the cost to society from the consumption of the next unit of the good is greater than the benefit society gains from the consumption of it.

Social optimum level of consumption is at Q^* where $MSC = MSB$.

For all consumption between Q^* and Q_e $MSC > MSB$.

On each of these units consumed there is a welfare loss. The total welfare loss is the shaded area shown in Figure 19.2.

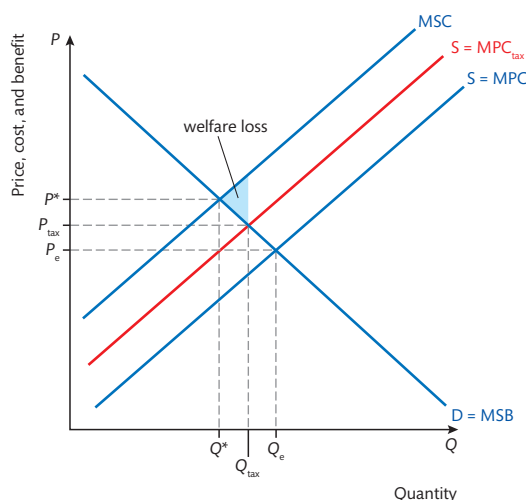
If all the consumers took into account the external costs they would place a lower value on the consumption of the additional unit and the demand for the good would fall.

Evaluate, using diagrams, government policies aimed at reducing the negative externalities of production

Taxation

A firm aims to maximize profit and only takes into account private costs, setting output at Q_e and at price P_e as shown in Figure 19.3. In order to reduce the welfare loss caused by the marginal social costs being greater than marginal social benefits at the equilibrium Q_e , P_e , the government can place a tax on the good thereby increasing the private costs causing the MPC curve to shift up and to the left.

If the tax set by government is equal to the marginal external cost at the social optimum level of output Q^* then marginal private cost rises so that marginal private cost + tax equals marginal social cost. The firm sets output at the social optimum level where $MPC + \text{tax} = MSB$ thereby removing the welfare loss. In effect the government, through taxation, tries to make the private optimum level of output the same as the social optimum level of output where $MSC = MSB$.



External costs, such as the cost to society of pollution, are difficult to assess. Costs might be undervalued therefore the government, acting on inaccurate information, places a tax that is less than the external costs. Private costs are increased and the MPC curve shifts up and to the left to $S = MPC_{\text{tax}}$. However, the private optimum level of output is still greater than the social optimum. The tax has reduced welfare loss but is not enough to correct **market failure** completely. At P_{tax} , Q_{tax} MSC is still greater than MSB leading to the welfare loss shown in the shaded area in Figure 19.3.

Figure 19.3

Model sentence: A tax makes the 'polluter pay'. It internalizes the externality. This means that the costs that were paid by third parties are now paid by consumers and producers who are in the market.

A tax reduces and can even eliminate welfare loss, if the value of the tax is sufficient to increase private costs so that MPC equals MSC at the social optimum level of output where $MSC = MSB$. An **allocatively efficient** outcome is achieved at P^* Q^* as shown in Figure 19.3.

The tax increases price. This can lead to a fall in international competitiveness, especially if foreign firms are not taxed in the same way. Jobs can be lost in exporting industries. As price increases **real income** falls and **consumer welfare** might actually fall.

Subject vocabulary

market failure when resources are not allocated or used optimally

allocative efficiency the best or optimal allocation of resources from society's point of view. It occurs when the market is in equilibrium and social surplus is maximized (where $P = MC$).

real income income after taking into account the effects of inflation on purchasing power

consumer welfare a measure of the benefit obtained from the consumption of goods

Legislation and regulation

The government can pass laws that force firms to reduce output, thereby reducing the external costs. This is very difficult to achieve. Firstly the government must evaluate the external costs correctly if the enforced level of output in the industry is to correct market failure. Secondly it cannot trust firms to stick to the social optimum level of output, particularly if high profits are being made. Therefore the government has to use **resources** to monitor the industry and **enforce** the regulations. The **opportunity cost** of such action has to be taken into account. The resources are not available to use elsewhere. It is possible that the cost of enforcing and monitoring is greater than the external costs. This is an example of **government failure**.

Firms by law could be made to buy new, more technologically advanced, capital designed to reduce harmful emissions. This has two effects. It reduces the harmful emissions that cause the negative externalities associated with pollution and it increases firms' marginal private costs, thereby reducing the private optimum level of output in the industry.

A complete **ban** is likely to lead to government failure. Again the policy has to be enforced. It would also lead to an increase in costs associated with a rise in unemployment as jobs are lost, and all consumer and producer surplus gained at the social optimum price and output will be lost resulting in a loss of social welfare.

Tradable permits

Tradable permits are issued to firms in an **industry** giving them the legal right to **emit** pollution up to a specified limit. A firm can either use the permits or sell them to another firm on the tradable permit market which then transfers the right to pollute. The government decides on the amount of pollution allowed to be emitted by an industry and then issues permits to the firms. If a firm has used up its allowance it can buy permits from other firms. The system provides an **incentive** for firms to invest in **cleaner technology**, thereby reducing pollution levels below the allowed amount and enabling them to sell the unused permits. If the cost of installing the new technologically improved capital is less than the price received from the sale of the permit then the firm benefits. As the supply of permits on the market falls and the government reduces the supply of permits the price rises and the incentive to reduce the level of pollution through **investment** in new capital increases. Through this market-based solution the industry is encouraged to reduce their levels of pollution to the desired amount, thereby reducing the negative externalities and correcting market failure.

The system requires monitoring and enforcing which uses up **scarce** resources and the government still has the problem of assessing the level of pollution allowed by the industry that ensures the social optimum level of output and the correction of market failure.

An example of a 'cap and trade' system was the Kyoto Protocol – an international agreement to reduce pollution from greenhouse gases which came into force in 2005. Each of the 170 or so countries that signed the **treaty** agreed to reduce the levels of greenhouse gases. Countries which do not achieve their targets are fined and those developed countries that exceed their permitted level are able to buy permits from less developed countries which have more generous allowances to pollute.

Evaluate, using diagrams, government policies aimed at reducing the negative externalities of consumption

The effect of an indirect tax – a step-by-step guide

Trouble shooter (See Figure 19.4 on page 52)

An indirect tax placed on a good is a way of internalizing the externality.

The aim is to make the producers and consumers in the market pay the external costs associated with the consumption of the good rather than third parties who are external to the market.

A per-unit indirect tax increases marginal social costs by the amount of tax and the MSC curve shifts up to the left from MSC to MSC_{tax} .

Private optimum level of consumption = social optimum level of consumption where $MSC = MSB$.

Subject vocabulary

resources the inputs into the production process, the factors of production

opportunity cost the next best alternative forgone

government failure occurs when government intervention, designed to correct market failure, causes a more inefficient allocation of resources than would be the case if government had not intervened

tradable permits an allowance issued by the government that allows a firm to emit pollution up to a specified limit. There is a market for permits where firms who have reached their limit can buy permits from firms who have not used up their allowance.

industry a group of firms that produce the same or similar goods or services

clean technology/ies a term used to describe technologically advanced capital that reduces waste, harmful emissions, and allows for the use of fewer non-renewable resources when used in the production process

investment the addition to capital stock

Glossary

enforce make people obey rules/laws

ban official order stopping something from being used/done

treaty(ies) formal written agreement(s) between countries/governments

Synonyms

emit release/produce

incentive encouragement/motivation

scarce limited/finite

Subject vocabulary

tax revenue the income the government receives through the levying and collection of taxes

price inelastic the percentage change in quantity demanded/supplied < the percentage change in price

black market an illegal market in goods or services

purchasing power a measure of how many goods and services a given amount of money can buy

consumer surplus the difference between the price a consumer is willing and able to pay and the price the consumer actually pays

demand the amount of a good that consumers are willing and able to buy at each price

Glossary

prohibition making something illegal/against the law

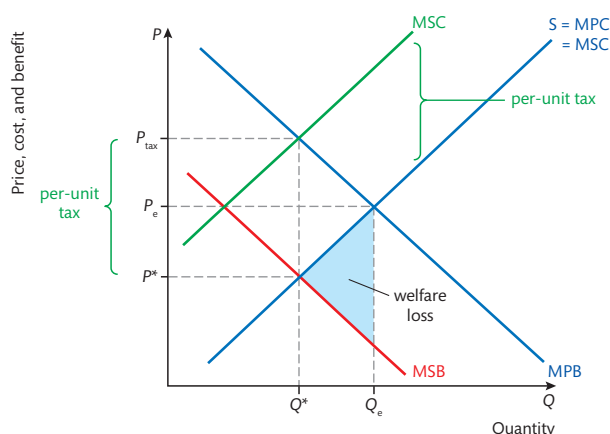


Figure 19.4

Governments use this method, amongst others, to reduce the external costs associated with the use of tobacco and alcohol. Demand for these goods is relatively **price inelastic** because they are habit forming, therefore even a relatively high per-unit tax may not reduce consumption to the social optimum level. Also even if the government set a high tax many consumers would seek to buy the good in an illegal market or **black market** where no tax is paid to the government. Therefore consumption falls by much less than the desired amount and the external costs remain high. At the same time the government receives much less tax revenue. This is an example of government failure. This occurs when government intervention leads to a more inefficient outcome than would occur without that intervention.

A tax increases the price the consumer pays thereby reducing the **purchasing power** of income. **Consumer surplus** is reduced and welfare is lost. Consumers earning relatively low incomes will be affected the most.

Banning the good

Prohibition of alcohol in the USA between 1920 and 1933 made the production and transportation of alcohol illegal. It opened up a huge illegal market. Tax revenue previously raised by the government fell to zero while consumption continued. Banning alcohol created high costs associated with the attempts to enforce the law and gave rise to much criminal activity involved in supplying for the demand. Many scarce resources were used to prevent production and consumption and the policy failed to control the external costs. Indeed it is likely that the negative externalities associated with the consumption of alcohol increased. Another example of government failure.

Banning smoking in public spaces and buildings has had some success in reducing consumption and governments continue to regulate in this area with some governments considering making smoking in private cars and in homes illegal, although this will be difficult and costly to enforce.

Negative advertising and education

In many schools students are taught about the dangers of alcohol and tobacco consumption. Governments fund advertising in the media and on the products aimed at reducing the perceived private benefit of consumption and raising awareness of the external costs associated with consumption, such as passive smoking. This reduces **demand** for the good causing the MPB curve to shift down and to the left. There is an opportunity cost of government intervention as the resources used cannot be put to alternative uses.

Model sentence: Left to the free market demerit goods are over consumed because consumers do not take into account the external costs. At the private optimum level of consumption $MSC > MSB$. Government must intervene to reduce consumption so that it falls to the social optimum level where $MSB = MSC$ thereby maximizing society's welfare.

Explain, using diagrams, why positive externalities of production cause welfare loss

Positive externalities or external benefits occur when benefits from the production of a good are enjoyed by third parties who are external to the market. Society enjoys benefits that are created by firms producing certain goods. When a firm trains its workforce it incurs a private costs but when a worker leaves to join another firm that firm enjoys the benefit of the trained workers without incurring the private cost associated with training.

The consumer pays a higher price at P_{tax} and consumption falls to the social optimum level Q^* thereby reducing the external costs associated with the consumption of the good. The government gains **tax revenue** which can be used, for example, to fund negative advertising campaigns that will reduce the perceived private benefit of the good and reduce demand for the good causing the MPB curve to shift down and to the left.

Firms in the paper industry plant trees regularly. Softwoods such as fir, spruce, and pine are used. They grow relatively quickly. Society benefits from the environmental advantages associated with trees but does not pay a private cost. Firms move into areas and pay local taxes. These taxes can be used by local government to make improvement to public spaces in the area. Again others outside of the market have benefited without incurring a cost. The firm producing enjoys private benefits but there are external benefits created by the firm that are enjoyed by third parties who do not pay a private cost.

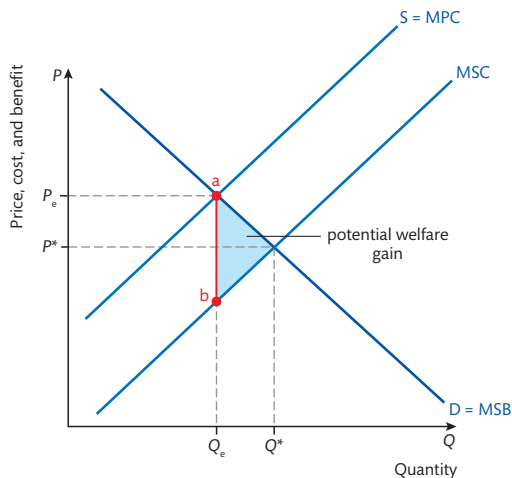


Figure 19.5

P_e , Q_e is an allocatively inefficient equilibrium. Price is too high and output is too low. The free market fails because not enough resources are allocated to the production of the good.

Explain, using diagrams, why positive externalities of consumption cause welfare loss

Consumers gain a private benefit from the consumption of a good. The addition to total benefit from the consumption of an additional unit is called the marginal private benefit. The consumption of some goods creates external benefits or positive externalities. These are benefits enjoyed by third parties. People who are external to the market. Marginal private benefit plus marginal external benefit equals marginal social benefit. The private consumption of healthcare creates positive externalities. Society benefits because the spread of disease can be reduced and workers who are healthier are more productive helping the economy to grow. There are external benefits associated with the consumption of education. A literate workforce is relatively more productive. Society benefits from having engineers, scientists, doctors, and so on. Private consumption of education not only benefits the consumer but also benefits third parties. Goods that create external benefits are called **merit goods**.

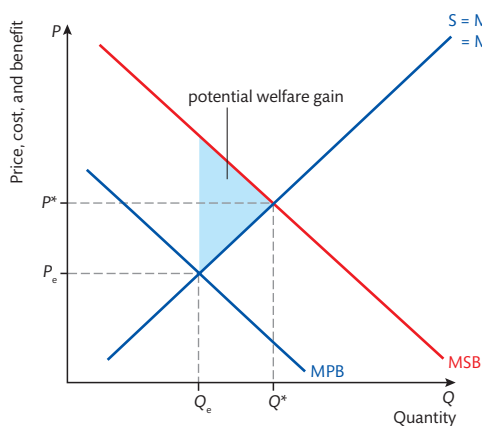


Figure 19.6

The marginal private cost incurred by the firm is greater than the marginal social cost. The firm chooses to set output at the private optimal level Q_e where $MPC = MSB$ (when $MSB = MPB$) as shown in Figure 19.5. At Q_e marginal social benefit exceeds marginal social cost, an **allocatively inefficient** outcome because at Q_e the benefit to society gained from the next unit produced is greater than the value of the resources used to produce it. Q_e to Q^* shows an area of output where $MSB > MSC$. It is the shaded area in Figure 19.5 showing the potential welfare gains of increased production. At Q^* marginal social benefit equals marginal social cost. That is, the benefit to society gained from the production of the next unit is equal to the value of the resources used in the production of it. P^* , Q^* is the **social optimum equilibrium**.

Subject vocabulary

allocative efficiency the best or optimal allocation of resources from society's point of view. It occurs when the market is in equilibrium and social surplus is maximized (where $P = MC$).

social optimum equilibrium occurs in a market where the benefit society receives from the consumption of the next unit is equal to the cost incurred by society of the next unit ($MSB = MSC$).

merit good a good/service that the government believes will be under consumed if left to the free market. Consumption of a merit good may generate positive externalities, therefore the social benefit of consumption is greater than the private benefit. Individuals do not take into account the positive externalities when deciding the amount to consume, therefore the good is underprovided and under consumed.

In Figure 19.6 it is assumed that there are no external costs therefore $MSC = MPC$.

An explanation of welfare gain – a step-by-step guide (see Figure 19.6 on page 53)

Trouble shooter

Private optimum equilibrium is at P_e Q_e where marginal private benefit equals marginal social cost.

At this level of consumption marginal social benefit, which is marginal private benefit + marginal external benefit, exceeds marginal social cost.

This means the benefit society gains from the consumption of the next unit is greater than the cost to society of the next unit.

The shaded area shows the potential welfare gain available to society if consumption increases from Q_e to Q^* .

At the social optimum equilibrium, P^* Q^* , $MSB = MSC$.

This means the benefit gained by society from the consumption of the next unit equals the cost to society of the next unit.

Q_e is an allocatively inefficient level of consumption. Consumption is too low. The free market fails because not enough resources are allocated to the production of the good.

Model sentence: Left to the free market merit goods are under consumed. Consumers do not take into account the external benefits. At the private optimum level of consumption $MSB > MSC$. Government must intervene to increase consumption so that it rises to the social optimum level where $MSB = MSC$ thereby maximizing society's welfare.

Evaluate, using diagrams, government policies aimed at increasing the production and consumption of merit goods and goods that create positive externalities in production

Discuss how a per-unit subsidy paid might correct market failure caused by positive externalities in production

$MSB > MSC$ at the private optimum level of output chosen by the firm. On all output between Q_e and Q^* , the social optimum level of output, $MSB > MSC$ therefore there is a potential welfare gain available on each unit of output from Q_e to Q^* . Total possible welfare gain is represented by the area a, b, c shown in Figure 19.7. A subsidy, a payment made by the government to a firm, provides an incentive for the firm to increase output. In

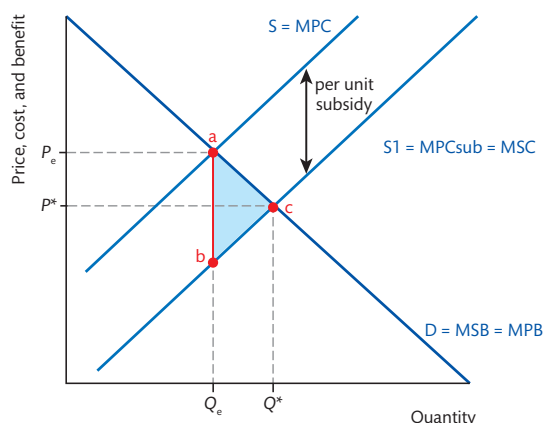
Subject vocabulary

supply the amount of a good that a firm is willing and able to produce at each price

market failure when resources are not allocated or used efficiently

allocative efficiency the best or optimal allocation of resources from society's point of view. It occurs when the market is in equilibrium and social surplus is maximized (where $P = MC$).

disposable income household income after direct taxation has been deducted



effect the per-unit subsidy reduces the firm's costs of production per unit and increases profit per unit at each price. The firm increases **supply** and the supply curve shifts down and to the right. The vertical distance between $S = MPC$ and $S_1 = MPC_{sub} = MSC$ is the value of the subsidy per unit. The firm increases output from Q_e to Q^* and society gains all the potential welfare. The social optimum equilibrium is where $MSB = MSC$. That is where the benefit society gains from the consumption of the next unit equals the cost of the resources used to produce it. The effect of the subsidy is to reduce price and increase production and consumption.

Figure 19.7

It is difficult to assess the value of the external benefits associated with the production of a good. Therefore the subsidy may not be enough to correct **market failure** and ensure **allocative efficiency** or indeed the subsidy might lead to overproduction and consumption of the good. There is a significant opportunity cost associated with subsidies. The total cost of the subsidy equals the subsidy per-unit multiplied by the social optimum level of output. Subsidies come from the tax payer and are paid from government tax revenue. The resources used are then unavailable to use in the provision of other community goods and services. There are

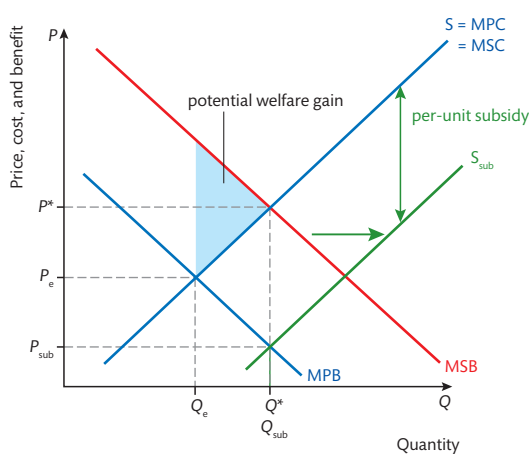
further opportunity costs. The tax levied to subsidize firms leaves households with less **disposable income**. Consumers are not able to use that money to gain benefit from the consumption of more goods and firms' welfare is affected because of the fall in **producer revenue**.

Direct provision by the government

The government could produce the good that has **positive externalities** associated with its production. For example, the government could provide training for workers through government-run institutions. Governments in countries with relatively free markets are often reluctant to become involved in the production of goods. They believe an efficient outcome is more likely if left to the markets. Governments recognize that they do not have the management expertise and other skills required for successful intervention. Also if losses are incurred the tax payer will have to fund them. Governments are very wary of the possible losses and the huge **opportunity costs** associated with direct provision.

Discuss how a per-unit subsidy paid might correct market failure caused by positive externalities in consumption

Education and health care are often subsidized by governments. At the free market level of consumption Q_e **marginal social benefit** is greater than **marginal social cost** leading to a loss of welfare. Left to the free market there will be a **misallocation of resources**. There will be an inefficient allocation of resources, the good would be under consumed and society would not enjoy enough of the external benefits available from the private consumption of the goods. A subsidy shifts the MPC curve down and to the right from $S = MSC$ to S_{sub} . This lowers the price and increases consumption. Price falls from P_e to P_{sub} and consumption increases from Q_e to Q^* , which is the social optimum level where $MSB = MSC$, leading to an increase in welfare.



There is a large opportunity cost associated with subsidies. The tax revenue used to subsidize the industry cannot be used to provide other community goods. The government needs to have enough tax revenue to be able to raise consumption in this way. Less developed countries with relatively low income and therefore low tax revenue find subsidizing such **merit goods** very difficult. In such countries society is unable to enjoy the external benefits created by the consumption of education and healthcare.

Figure 19.8

The government can promote the consumption of merit goods through education and advertising. The government can attempt to raise the perceived private benefit thereby increasing demand for the good. The MPB curve shifts up and to the right so that $MPB = MSB$. The social optimum level of consumption is achieved at Q^* where $MSB = MSC$. This strategy is not likely to see success in the short term and again there is an opportunity cost.

The external benefits for the economy from the consumption of education and healthcare are very large; therefore some governments provide it free at the point of use. The services are provided entirely through government expenditure. In other countries they are provided by a combination of the state, private firms, and charities.

Test your understanding of this unit by answering the following questions

- Discuss, using diagrams, policies the government could adopt to correct market failure caused by negative externalities in consumption and production.
- Discuss, using diagrams, policies the government could adopt to correct market failure caused by positive externalities in consumption and production.

Subject vocabulary

producer revenue the income a firm receives from consumers in exchange for goods (revenue = price × quantity sold)

positive externalities occur when the production or consumption of a good causes benefits to third parties. The existence of positive externalities means that social benefit is greater than private benefit.

opportunity cost the next best alternative forgone

marginal social benefit marginal social benefit = marginal private benefit + marginal external benefit. It is the additional social benefit generated by the consumption or production of an additional unit of output.

marginal social costs marginal social cost = marginal private cost + marginal external cost. It is the additional social cost generated by the consumption or production of an additional unit of output.

misallocation of resources occurs when the allocation of resources leads to welfare loss and therefore a reallocation of resources could increase society's welfare

merit good goods that the government believes will be under consumed left to the free market. Consumption of a merit good may generate positive externalities therefore the social benefit of consumption is greater than the private benefit.

Learning Outcomes

- Using the **concepts** of rivalry and excludability, and providing examples, distinguish between public goods (non-rivalrous and non-excludable) and private goods (rivalrous and excludable).
- Explain, with reference to the free-rider problem, how the lack of public goods indicates market failure.
- Discuss the implications of the direct provision of public goods by government.

Synonyms

concept(s) idea(s)/
theory/ies

consumption ... use

diminish become
smaller

incentive encouragement/
motivation

Subject vocabulary

free market a market where the forces of demand and supply are allowed to operate without any forms of intervention

non-rivalrous describes a good whereby consumption of it by one person does not reduce the amount available to others

non-excludable describes a good whereby it is impossible to stop people benefiting from the consumption of it once it has been supplied

quasi-public goods goods that share some of the characteristics of public goods but are not fully non-excludable and non-rivalrous. A road is an example. Most roads are free at the point of use but it is possible to make people pay through tolls and when traffic is heavy the amount available to others to use does begin to diminish so there can be rivalry in consumption.

social optimum level of output the level of production or consumption where marginal social benefit is equal to marginal social cost

Glossary

national defence the systems that a country uses to defend itself against attack

flood barrier a structure that stops/slow down the overflow of water

flood defences structures put into place to protect dry areas from water

Distinguish between public goods and private goods

Public goods are goods that would not be supplied if left to the **free market**. Public goods would not be supplied because they share two characteristics: the goods are **non-rivalrous** and **non-excludable**.

Model sentence: A good is non-rivalrous when **consumption** by one person does not **diminish** the amount of the good available for others. A good is non-excludable when once supplied it is impossible to stop people gaining a benefit from the consumption of it.

A private good is both rivalrous and excludable. Consumption of the good by one person does diminish the amount available for others thereby stopping others from consuming it. Once it is supplied it is possible to stop people gaining the benefits from the consumption of it.

A chocolate bar is a private good. It is rivalrous and excludable. After the chocolate has been consumed by one person it is no longer available for consumption by others and once supplied it is possible to stop a person consuming it. Simply put, if a person does not pay for the bar of chocolate he/she cannot enjoy the benefit gained from its consumption.

National defence is a pure public good. It is entirely non-rivalrous and non-excludable. One citizen enjoying the benefits of national security, for example, does not diminish the amount available for others to enjoy and once provided by the government it is impossible to stop people enjoying the benefits it provides. The **flood barrier** across the River Thames in London is another example. Consumption by one does not reduce the amount of benefits in terms of safety and protection of property available for others and once provided it is not possible to exclude people from enjoying the benefits it brings.

Some goods, such as roads, are non-rivalrous and non-excludable to some extent. These goods are called **quasi-public goods**. At quiet times one person driving on a motorway does not, in any meaningful sense, diminish the amount of the motorway available for others to enjoy although at busy times the next person using the motorway does start to cause congestion and the amount of space available for others starts to diminish. Also it is possible to stop people enjoying the benefit gained from driving on the road by installing barriers. Only if a consumer pays the toll can they use the road. Nevertheless, the cost of road construction is extremely high and therefore a motorway would not be built without at least some government expenditure.

Explain why the free-rider problem leads to market failure and why the government intervenes

Why does the market fail if left to the free market? A step-by-step guide

Trouble shooter

There are benefits gained by society from the consumption of national defence and **flood defences** as well as costs to society of providing the goods.

The social optimum level of output and consumption is where marginal social benefit equals marginal social cost.

However, because of the free-rider problem, left to the free market there will be no output.

This means that for all output between zero and the **social optimum level** marginal social benefit is greater than marginal social cost.

This means that the benefit to consumers in society from the consumption of the additional unit is greater than the cost to producers in society of the resources used to supply it.

The free-rider problem leads to a misallocation of resources. No resources in a free market would be allocated to the supply of the public good leading to a loss of welfare.

The government must supply the good, using **tax revenue**, up to the social optimum level in order to maximize society's welfare thereby correcting **market failure**. Evaluating the benefits and costs is not easy and often open to debate. For example, should the government install nuclear weapons and if so how many and of what size? The benefits of nuclear deterrence is greatly disputed and the costs are enormous. The politicians must balance the benefits and the costs and decide the amount and type of weapons necessary to maximize society's welfare. There are **opportunity costs** associated with expenditure on public goods. Resources are limited and if spent on national defence they are not available to provide other pure public goods, quasi-public goods or merit goods.

Model sentence: If people cannot be excluded from enjoying the benefits of a good they have no **incentive** to pay for it. They would 'free ride', enjoying the benefits without incurring a cost. If consumers do not pay there is no profit available so it will not be supplied.

Test your understanding of this unit by answering the following questions

- Distinguish between pure public goods and merit goods.
- Explain why the free-rider problem leads to market failure.

Subject vocabulary

tax revenue the income the government receives through the levying and collection of taxes

market failure when resources are not allocated or used efficiently

opportunity cost the next best alternative forgone

cap and trade scheme a system whereby a limit or cap is placed on certain types of emissions. Producers are able to sell or trade their unused allowances to producers that have gone over their limit.

Learning Outcomes

- Describe, using examples, common access resources.
- Describe sustainability.
- Explain that the lack of a pricing mechanism for common access resources means that these goods may be overused/depleted/degraded as a result of activities of producers and consumers who do not pay for the resources that they use, and that this poses a threat to sustainability.
- Explain, using negative externality diagrams, that economic activity requiring the use of fossil fuels to satisfy demand poses a threat to sustainability.
- Explain that the existence of poverty in economically less-developed countries creates negative externalities through over-exploitation of land for agriculture, and that this poses a threat to sustainability.
- Evaluate, using diagrams, possible government responses to threats to sustainability, including legislation, carbon taxes, **cap and trade schemes**, and funding for clean technologies.
- Explain, using examples, that government responses to threats to sustainability are limited by the global nature of the problems and the lack of ownership of common access resources, and that effective responses require international cooperation.

Explain the term 'the tragedy of the commons' and 'sustainability'

There are many differing views amongst economists on the meaning of the term 'sustainability'. Generally it is agreed that sustainability is about using the world's existing resources today to satisfy our present needs in a way that does not stop others in the future satisfying their needs.

The tragedy of the commons is a theory about the overuse of resources. It refers to the **depletion** of resources that are held in common (available for everybody to use). Continued, uncontrolled exploitation of a resource is unsustainable because it will be overused and therefore will not be available for others in society to use in the future. The situation arises when individuals or firms cannot be excluded from gaining private benefit from the **consumption** of the resource.

For example, when parts of the ocean are held in common fishermen cannot be stopped from taking their **trawlers** into the area to fish. The fishermen gain a private benefit and therefore have an **incentive** to carry on catching fish despite the fact that over exploitation of this resource will eventually lead to the stocks of fish available falling to very low levels or might lead to the extinction of a particular species, thereby reducing the amount available for others to enjoy in the future. Any future private benefit will be limited and welfare will be lost.

Glossary

exploitation making use of something to gain maximum profit from it

depletion reduction in amount

trawlers type of fishing boat

Synonyms

consumption .. use

incentive encouragement/ motivation

Synonyms

ration limit/restrict

scarce limited/finite

emit release/produce

emissions ... release/
production

intervene ... get involved

Glossary

conserved saved/ used more sparingly

acid rain rain that contains acid which can harm the environment

flood barrier a structure that stops/slows down the overflow of water

respiratory related to breathing/the lungs

Subject vocabulary

external cost occurs when the production or consumption of a good creates a cost that must be paid by third parties

negative externalities occur when the production or consumption of a good creates costs that must be paid by third parties. The existence of negative externalities means that social cost is greater than private cost.

industry a group of firms that produce the same or similar goods or services

marginal social costs
marginal social cost = marginal private cost + marginal external cost. It is the additional social cost generated by the consumption or production of an additional unit of output.

marginal social benefit
marginal social benefit = marginal private benefit + marginal external benefit. It is the additional social benefit generated by the consumption or production of an additional unit of output.

welfare loss the sum of the loss of consumer and producer surplus caused by intervention or lack of competition in markets

marginal private benefit is the additional private benefit generated by the consumption or production of an additional unit of output

Explain why a resource that has no price might not be sustainable

Unsustainable use of a resource occurs when it is free, and open to all to exploit. Uncontrolled access leads to over exploitation, leaving very little for others to use and it eventually might run out completely. When a price is not charged for the direct use of a resource the resource is not rationed (see pages 15–16 for a detailed explanation of the rationing function of price). In markets, generally when price rises for a resource consumers **ration** their use of it, and as the resource becomes scarcer and as supply falls, the price increases leading to a greater fall in consumption. In this way **scarce** resources are **conserved**.

Model sentence: When there is no price there is no incentive to ration use of the resource thereby leading to its depletion. This is not sustainable because the resource will run out and there will be little if any left for future generations to enjoy.

Explain, using negative externality diagrams, why the use of fossil fuels poses a threat to sustainability

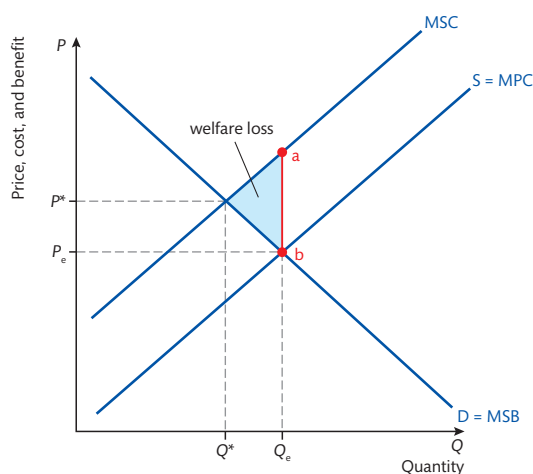


Figure 21.1

Suppose an **industry** burns coal as a source of energy. The industry pays the private cost which is the price of the coal. The burning of coal creates external costs that are not paid for by the firm but are paid by third parties. The social optimum level of output is where **marginal social cost** = **marginal social benefit** at Q^* . However, the industry sets output where $MPC = MSB$ at Q_e where the $MSC > MSB$. This causes **welfare loss** on all units from Q_e to Q^* . There is a misallocation of resources. Price is too low and output is too high. The government must **intervene** in order to correct market failure.

Driving cars causes negative externalities from the burning of petrol. Cars emit harmful gases that pollute the air creating **respiratory** problems as well as contributing to global warming. **Marginal private benefit** is greater

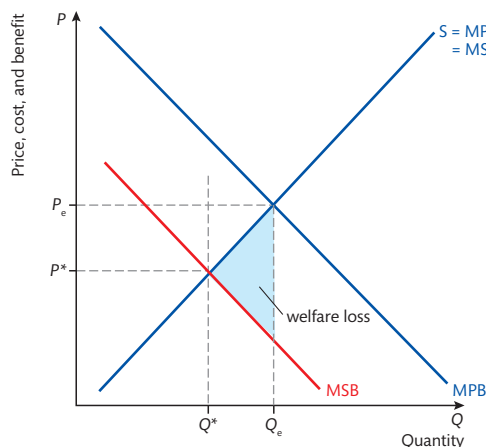


Figure 21.2

As fossil fuels such as coal, oil, and natural gas are burnt they **emit** harmful greenhouse gases into the atmosphere. There are **external costs** or **negative externalities** caused by these **emissions** such as damage to people's health from breathing the polluted air and damage to rivers, forests, and farming land from **acid rain**. Most scientists argue that the burning of fossil fuels is a major cause of global warming, the external costs of which may be very high. Future generations may have to pay the external costs of production. For example, if climate change causes the sea level to rise, the **flood barrier** across the Thames in London may need to be replaced. In this case the third parties are the future generations of taxpayers who will have to pay for its construction.

than marginal social benefit. This reflects the fact that the private benefit gained from the use of cars is greater than the benefit gained by society. The individual car user sets consumption at Q_e where $MPB = MPC$. The social optimum level of output is at Q^* where $MSB = MSC$. As seen in Figure 21.2 on all output between Q_e and Q^* $MSC > MSB$ causing a welfare loss on all these units. Total welfare loss is the shaded area. There is a misallocation of resources when left to the free market. Consumption is too high. In order to reduce the negative externalities associated with car use and correct market failure the government must intervene.

The burning of fossil fuels in huge quantities today reduces the amount available for others in the future, thereby affecting the ability of future generations to satisfy needs and wants. Also the external costs associated with the burning of fossil fuels will be paid by future generations thereby reducing the amount of income they will have available to satisfy needs and wants. It can be argued that the world's scarce resources are being used today to satisfy the growing needs of the current population in a way that diminishes the ability of future generations to satisfy their needs. Therefore it is unsustainable.

Explain why negative externalities created by the over-exploitation of land for agricultural output particularly affect less-developed countries

People in LDCs are relatively poor. They often rely entirely on the production of **primary goods** and agricultural goods for their incomes. The world price of such goods tends to fall over time as new methods of production are employed that increase output from the land such as new fertilizers and capital equipment. As supply increases, price falls. Capital in LDC is often relatively less technologically advanced as low incomes mean farmers are not able to buy expensive capital. Nor are farmers able to buy fertilizers. Therefore **productivity** is lower. As world price falls over time and the agricultural industry becomes relatively less productive incomes become difficult to maintain. Farmers over-use the land trying to maximize output in the short term. Land is never left fallow (unused). When land is continuously used to grow crops year on year, the soil cannot retain the nutrients and moisture in the longer term, therefore the quality and productivity of the land falls overtime. Over exploitation of the land creates external costs, such as long-term soil **degradation**. Future generations will find it increasingly difficult to earn an income from farming the land.

Evaluate, using diagrams, possible government responses to threats to sustainability and explain the need for international agreement

Extension of property rights

Model sentence: A resource held in common is overused because nobody owns it and therefore no price is charged or cost incurred to use it.

This is unsustainable in the long term. A river that is not owned by any person or group is at risk of being polluted by firms' harmful emissions. If ownership is given to a water company, for example, each time a firm polluted the river, it could be charged or fined, thereby increasing the firms' **private costs** and affecting output decisions.

Government could give people the right to **sue** firms if air pollution leads to health problems, thereby increasing the producers' marginal private costs and reducing private optimum level of output, resulting in fewer external costs. Extending property rights internalizes the externality: negative externalities are brought back into the **market mechanism**.

Cattle can **graze** on common land for free. Therefore the land is over exploited and in the long term the soil will be degraded. If ownership of the land was passed to the farmers in the area it would give them greater incentive to consider the benefits gained from use of the land over the longer term rather than just in the short term.

Subsidizing clean technologies

The burning of fossil fuels creates lots of external costs so governments around the world want to increase the use of renewable sources of energy such as wind power, solar power, hydropower, and biofuels as a way of reducing the negative externalities associated with the consumption of fossil fuels. Many countries have signed **treaties**, agreeing to cut emissions of harmful gases and are fined if they do not achieve the agreed targets. Governments can encourage the development, production, and use of such renewable energy through the provision of a **subsidy**. (See pages 36–38 for a full explanation of the effects of a subsidy and a diagram illustrating the effects).

Subsidies given to the solar and wind power industries in effect reduce **costs of production** causing firms to increase **supply**. The price consumers pay falls and quantity consumed increases. Firms gain greater **revenue** as they receive the price paid by the consumer plus the subsidy per unit sold.

As revenue and profit rise in the solar and wind power industries resources are reallocated. More resources are used in the development and production of renewable energy while fewer are used in the fossil fuel industry thereby reducing negative externalities.

There are some external costs associated with renewable energy. Wind farms are an **eyesore** to some and create noise pollution. There is evidence that the value of houses near wind farms have been negatively affected. Some scientists are concerned that renewable energy creation is relatively inefficient and that supply

Subject vocabulary

primary good a good that has not been processed and is in a raw state (e.g. fruit/wheat)

productivity the quantity of output per unit of input

private costs the cost incurred by firms or consumers from their own production or consumption of a good

market mechanism the process by which consumers and producers, acting in their own interest in a free market, determine the market price and quantity of a good and therefore the quantity of resources allocated to the production of the good

subsidy payment made by government to firms per unit of output

costs of production the amount the firm pays for the factors of production used to produce goods or services

supply the amount of a good that a firm is willing and able to produce at each price

revenue the income a firm receives from consumers in exchange for goods (revenue = price × quantity sold)

Glossary

degradation becoming worse in condition

sue make a legal claim for harm done

graze feed on grass

treaty(ies) formal written agreement(s) between countries/governments

eyesore something that is very ugly

of energy from such sources will never be able to meet the world's growing demand. This would lead to market failure in the goods markets as the ability of industries to produce output is restricted through lack of energy.

Subject vocabulary

market forces the forces of demand and supply that interact in a competitive market and determine equilibrium price

market failure when resources are not allocated or used optimally

negative externalities occur when the production or consumption of a good creates costs that must be paid by third parties. The existence of negative externalities means that social cost is greater than private cost.

market where buyers and sellers meet to exchange money for goods and services

supply the amount of a good that a firm is willing and able to produce at each price

demand the amount of a good that consumers are willing and able to buy at each price

output the quantity of goods produced by a firm, industry or economy

invest to buy capital goods and services

capital (goods) manufactured goods that are used in the production of other goods

external cost occurs when the production or consumption of a good creates a cost that must be paid by third parties

perfectly inelastic supply quantity supplied does not change as price changes. PES equals zero.

opportunity cost the next best alternative forgone

social optimum level of output the level of production or consumption where marginal social benefit is equal to marginal social cost

Synonyms

forgone sacrificed/
given up

Cap and trade schemes

Such schemes use **market forces** to correct **market failure** caused by **negative externalities** (see page 51 for a full explanation of how the use of tradable permits can correct market failure). The government issues permits to firms in the industry giving them permission to pollute up to a specified amount for which the firm pays a price. In effect the holder of permits has the property rights and can sell them. The sum of the firms' allowable levels of pollution is the total amount of pollution allowed in the industry.

If a firm uses up its allowance to pollute it can buy permits from those firms who have not used up theirs.

There is a **market** for the permits. There is a fixed **supply** of permits and if **demand** increases for the **output** of the industry some firms may wish to buy more permits in order to increase output. Therefore the price of

permits will increase and some firms will now consider **investing** in cleaner production methods rather than buying permits. Over time the government can restrict the supply of newly issued permits in order to increase the price of the permits on the market. This in turn increases the incentive for firms to invest in new cleaner **capital** that reduces levels of harmful emissions, thereby reducing the **external costs** and correcting market failure.

Supply is **perfectly inelastic** with respect to price. Supply is fixed. Increases in demand for permits results in an increase in price from P to P_1 as shown in Figure 21.3. The government can reduce supply of new permits and the supply curve shifts to the left causing price to rise from P_1 to P_2 .

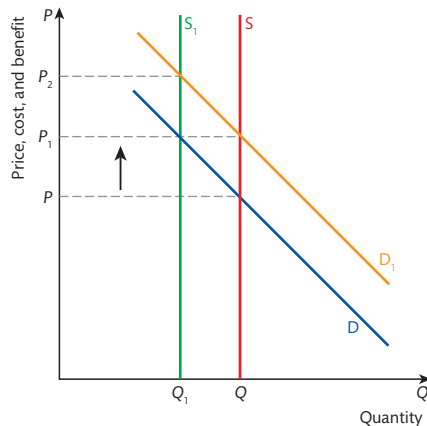


Figure 21.3

This method is seen as an efficient way in which to reduce emissions. Those firms where the cost of replacing capital is less than the price of permits will replace their capital and sell their permits. Those firms who find it more costly to cut down on levels of pollution emitted will buy permits instead. Over time, because of falling supply and perhaps increasing demand, the price of permits increases providing greater incentive for the remaining firms to buy the new capital. In this way, through the use of market forces, the external costs created by an industry can be massively reduced.

Scarce resources must be used by the government to monitor the schemes to ensure all firms are polluting within the allowed amount. Those that over pollute are heavily fined. There is a major **opportunity cost** of such schemes because the spent resources are not available for the government to use elsewhere. The next best alternative is **forgone**.

Carbon taxes

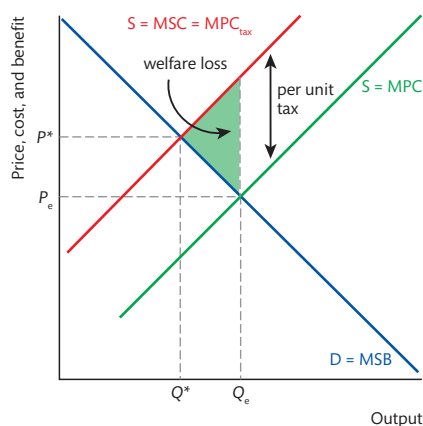


Figure 21.4

Because the tax makes using fossil fuels more expensive, it encourages producers and consumers to reduce consumption by rationing their use of it and they have an incentive to use fuels with less carbon emissions.

A carbon tax is a charge set by government on the use of fossil fuels. The amount of the tax is dependent on the amount of carbon that is released when the fuel is burned. The higher the amount of carbon, the greater the external costs therefore the higher the tax must be to correct market failure. Figure 21.4 shows the effect of a tax. At the private optimum level of output, Q_e , $MSC > MSB$ leading to a welfare loss, shown as the shaded area. The tax increases marginal private costs so that $MPC_{tax} = MSC$ at the **social optimum level of output**. The firm reduces output from Q_e to Q^* where $MSC = MSB$ which is the social optimum level. The market outcome is that price rises and quantity falls thereby reducing the negative externalities brought about by the burning of the fossil fuel.

The international perspective

The impact of any government policy response implemented to correct market failure caused by negative externalities is going to be very limited if only a few governments support and enforce such policies. **Economic growth** increases harmful emissions because often old technologies are used in production. In China, for example, where output has increased dramatically in the last few decades there has been a huge increase in harmful emissions offsetting reductions made elsewhere. Some scientists argue that pollution is causing the world's climate to change and this will create far-reaching external costs. Therefore they call for an international response to the problem.

Test your understanding of this unit by answering the following questions

- Explain why a resource that is held in common may be overused.
- Explain how subsidies might be used to correct market failure caused by the use of fossil fuels.
- Explain how the extension of property rights can internalize the externalities caused by over exploitation of resources.
- Evaluate the use of a tradable permits scheme as a method to reduce the global level of harmful emissions.

Learning Outcomes

- Explain, using examples, that market failure may occur when one party in an economic transaction (either the buyer or the seller) possesses more information than the other party. (HL)
- Evaluate possible government responses, including **legislation**, **regulation**, and provision of information. (HL)
- Explain how monopoly power can create a welfare loss and is therefore a type of market failure. (HL)
- Discuss possible government responses, including legislation, regulation, **nationalization**, and **trade liberalization**. (HL)

Explain why imperfect information leads to market failure (HL)

A market is a place where buyers and sellers come together to exchange goods and services for money. **Asymmetric information** occurs in a market when a buyer and a seller do not share all information. One party in the transaction has access to information that the other party does not thereby gaining an advantage. More often than not it is the seller who has information regarding the good that is not shared with the buyer. For example, a second-hand car dealer knows that there is a fault with a car. The seller does not inform the buyer of this fact. The buyer places a greater value on the **benefit** gained from owning the car than he would if he had perfect knowledge. Therefore the buyer is prepared to pay a higher price than he would if in possession of all the information. The second-hand car market fails because of asymmetric information.

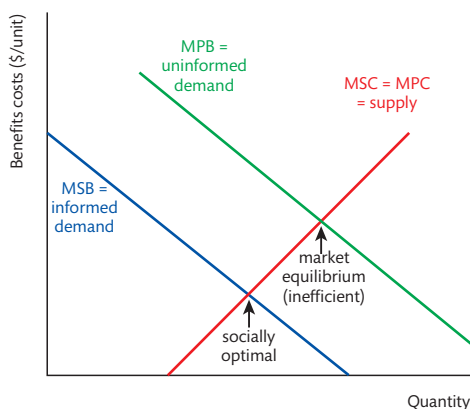


Figure 22.1

Subject vocabulary

economic growth an increase in real GDP

Glossary

legislation law/set of laws

Synonyms

regulation(s) law(s)/rule(s)

Subject vocabulary

nationalization the process by which a government takes ownership of a private firm or industry

trade liberalization the removal of, or reduction, in the international barriers to trade, such as tariffs and quotas

asymmetric information a situation in which one person in a market has more information than the other person

benefit the satisfaction gained from the consumption of a good

Subject vocabulary

marginal private benefit is the additional private benefit generated by the consumption or production of an additional unit of output

market equilibrium occurs when the quantity demanded of goods produced in an industry equals the amount of goods firms in the industry are willing to supply

resources the inputs into the production process, the factors of production

misallocation of resources occurs when the allocation of resources leads to welfare loss and therefore a reallocation of resources could increase society's welfare

market failure when resources are not allocated or used optimally

social optimum equilibrium occurs in a market where the benefit society receives from the consumption of the next unit is equal to the cost incurred by society of the next unit ($MSB = MSC$)

insider trading the practice of profiting from trading in shares through having information that is not available to others in the market

public limited companies a form of business organization in which shares are offered for sale to the general public. Shareholders own the business and receive a share of the profits. Liability is limited to the amount paid for the shares.

share a unit of ownership of a company's capital. The owner is entitled to a proportion of the company's profit.

merger the joining together of two or more companies to make one larger company

Synonyms

consumption use

manipulate influence/control

Glossary

exaggerating making something sound better than it really is

Explain how market failure is caused by imperfect information (HL) – a step-by-step guide (see Figure 22.1 on page 61)

Trouble shooter

When suppliers have negative information about a good that is not shared with the consumers

marginal private benefit will be greater than marginal social benefit.

The **market equilibrium** is socially inefficient because marginal social cost is greater than marginal social benefit meaning that the cost of the **resources** used to produce the next unit is greater than the benefit society gains from the **consumption** of it.

There is a **misallocation of resources**: too many resources are allocated to the production of the good; price and output are too high.

When consumers have all the information demand falls and **market failure** caused by asymmetric information is corrected.

Consumers now have all the information and place a lower value on the consumption of the next unit. Price, output and consumption fall. Fewer resources are now allocated to the production of the good.

The **social optimum equilibrium** is achieved where $MSB = MSC$.

Model sentence: If consumers do not have all the information regarding a good they will over value the benefit gained from the consumption of it and will therefore be prepared to pay a higher price.

Explain how market failure caused by asymmetric information might be corrected (HL)

In order to correct market failure and reduce the welfare loss caused by imperfect information the government must intervene in the market and provide the full information regarding goods and services.

Firms attempt to **manipulate** consumer demand through advertising and marketing, often **exaggerating** the benefits available from use of the good. Consumers then believe there to be a greater private benefit than there actually is. This leads to market failure and welfare loss as previously explained. It is very difficult for the government to intervene effectively in the case of marketing. It is illegal for firms to make false claims about their goods, but there is a very fine line between exaggerating benefits and lying about the benefits. Nevertheless, in many countries governments have legislated in this area to try to protect consumers from inaccurate and misleading information.

There are laws against **insider trading** in the stock market. This occurs when an individual or group of individuals are in possession of information regarding a **public limited company** that is not shared with the rest of the market. For example, when two companies merge it is likely that the value of a **share** will increase. If some people know about the **merger** before it is known by the market then they can make enormous capital gains from buying the shares at a relatively low price and then selling after the increase in price brought about by the increase in demand for shares once the information has been made available to the market. Governments have made insider trading illegal and the penalties relatively tough.

Estate agents sell houses on behalf of the owners in return for a small percentage of the selling price. Agents may have information regarding a house that would, if known by the market, reduce demand and selling price of the property. The agent might not share the information because of the incentive of a higher price and therefore a higher fee.

It is very difficult for the government to intervene and correct market failure. When the information is known by only a few people then the government is unlikely to know about it. Asymmetric information has to be identified and then it must be proved that a person had the information and acted to benefit from it before he or she can be punished.

The government can, through advertising and education, increase the amount of information available for consumers. Warnings concerning questionable business practice can be issued thereby allowing the consumer to make a correct assessment of the true benefit gains from consumption. For example, consumers made aware of the risks of certain financial investments are able to make a decision about whether or not to invest based on better and unbiased information.

Explain how monopoly power can create a welfare loss (HL) (see pages 85–93 for a detailed explanation of the consequences of monopoly power)

A firm that is the sole supplier of a good has **monopoly power**. The firm is the industry and therefore can control price or **quantity supplied**. The firm reduces output in order to increase price thereby increasing **producer revenue** and profit. Increasing price reduces **consumer surplus** and increases **producer surplus**

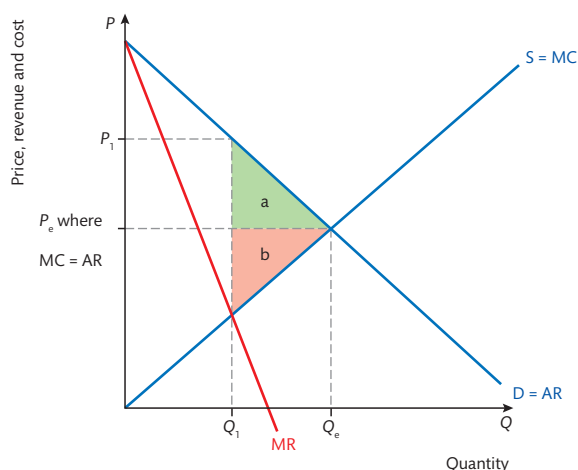


Figure 22.2

The **monopolist** reduces output to Q_1 . Price rises to P_1 . At P_1 , Q_1 , $P > MC$. This means the value consumers in society place on the consumption of the additional unit is greater than the cost of the **resources** used to produce it. There is a welfare loss to society on all output from Q_1 to Q_e . This is represented in the diagram by the shaded area a, the loss of CS, and area b, the loss of PS. The sum of the two losses is the welfare loss caused by the restriction of output and the increase in price.

Not enough resources are allocated to the production of the good. Monopoly power causes welfare loss and the market to fail.

Discuss possible government responses to monopoly power (HL)

The government can intervene to try to correct market failure by making markets more competitive. The government can reduce barriers to entry, for example, by granting licences to more airlines allowing them to compete on specific routes. State monopolies could be opened up to competition. Greater competition will drive down prices and increase consumption thereby reducing welfare loss.

Industries become more concentrated after mergers. Governments, through for example the **monopolies commission**, sometimes do not allow mergers to take place thereby retaining a greater degree of competition in the market and therefore ensuring lower prices and greater consumption.

Competition laws make certain practices illegal, such as the formation of **cartels**. In **oligopolistic markets** it is possible for firms to **collude** and set a higher price in order to increase profit. Such laws could be strengthened, monitored, and penalties increased to reduce this behaviour.

Government agencies, such as Ofwat in the UK – which was set up to monitor providers of water and sewage services – can work to limit **abuse** of market power. Agencies, for example, have the power to limit the extent of any price increase in the industry thereby minimizing any welfare loss.

Test your understanding of this unit by answering the following questions

- Explain why asymmetric information leads to welfare loss. Illustrate your answer with a diagram.
- Explain how a monopolist causes welfare loss. Illustrate your answer with a diagram.
- Using examples and a diagram, explain how market failure caused by monopoly power might be corrected.

Subject vocabulary

monopoly power the degree of control a firm has over the setting of price

quantity supplied the amount of a good that firms are willing and able to produce at a given price over a given period of time

producer revenue the income a firm receives from consumers in exchange for goods (revenue = price \times quantity sold)

consumer surplus the difference between the price a consumer is willing and able to pay and the price the consumer actually pays

producer surplus the difference between the price a firm is willing to accept for a unit of output and the price the consumer actually pays

market power the ability of a firm to change the market price of a good or service

free market equilibrium a free market is in equilibrium where the quantity supplied is equal to the quantity demanded

monopolist a firm that dominates an industry

resources the inputs into the production process, the factors of production

monopolies commission a public body that investigates mergers and other matters regarding competition law in the UK

cartel a collection of firms that agree to work together to maximize their joint profit

oligopolistic market describes a market that is controlled by a small number of firms

collude to act together with others to achieve a common goal, such as raising prices/maximizing profit

Glossary

abuse misuse/the wrong use